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Application No. 09/862,979

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Could. second position, wherein the exit plane of the exhaust duct lies substantially downstream of the exit aperture of the shroud.

REMARKS

Claims 1-16 are pending herein. By the Office Action, claims 1-16 are rejected under 35 U.S.C. §112, second paragraph; claims 1-3, 5-7, 9-11 and 13-15 are rejected under 35 U.S.C. §102(b) and §103(a); and claims 4, 8, 12 and 16 are objected to. By this Amendment, the specification and claim 1 are amended. No new matter is added.

The attached Appendix includes marked-up copies of each rewritten paragraph (37 C.F.R. §1.121(b)(1)(iii)) and claim (37 C.F.R. §1.121(c)(1)(ii)).

Applicants thank the Examiner for the indication that claims 4, 8, 12 and 16 contain allowable subject matter, but are objected to only for being dependent upon a rejected base claim. All of the pending claims are believed to be allowable for the reasons described below.

I. Rejection Under §112

Claims 1-16 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Applicants respectfully traverse the rejection.

The Office Action cites various informalities in claim 1, and requires that they be corrected. By this Amendment, claim 1 is amended to clarify the claimed invention without altering the scope of the claim. It is believed that these amendments address the various issues raised in the rejection.

The Office Action indicates that in claims 5-8, it is unclear what structural elements are intended to correspond to the claimed reheat system. Applicants respectfully submit that no claim amendments are necessary to address this ground of the rejection. Instead,

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Applicants submit that reheat systems are well known in the art, as are the structural elements of such systems. In the present application, claims 5-8 further specify that the shrouded nozzle arrangement of the present claims includes a reheat system provided within the duct means. Because various reheat systems are well known in the art, further identification of specific structural elements of such reheat systems in the present claims is unnecessary. The claims as pending would be readily understood by one of ordinary skill in the art, and would not be considered indefinite.

The Office Action also indicates that in claims 13-16, it is unclear what portion or configuration of the shroud serves to minimize the radar and infrared signatures. In response, Applicants respectfully submit that the claims as presented are not indefinite. Based on the disclosure of the present specification, combined with the knowledge that one of ordinary skill in the art is deemed to possess, one of ordinary skill the art would not consider the present claims indefinite where they specify that the shroud is configured to minimize the radar and infrared signatures of the nozzle and exhaust gas issuing from the nozzle. For example, the specification describes in the second full paragraph of page 4 that the radar and infrared signatures of the nozzle and exhaust gas can be minimized by providing a secondary air flow between the inner surface of the shroud and the outer surface of the nozzle. Other methods and configurations for using the shroud to minimize the radar and infrared signatures of the nozzle and exhaust gas would be readily apparent to one of ordinary skill in the art based on the present specification.

For at least these reasons, claims 1-16 are not indefinite. Reconsideration and withdrawal of the rejection are respectfully requested.

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II. Rejections Under §102

A. Wallace, Jr.

Claims 1-3, 5-7, 9-11 and 13-15 are rejected under 35 U.S.C. §102(b) over Wallace, Jr. The Office Action alleges that Wallace, Jr. discloses all of the limitations of the claimed invention. Applicants respectfully traverse this rejection.

The claimed invention of independent claim 1 is directed to a shrouded nozzle arrangement for a gas turbine engine exhaust gas comprising a gas turbine, an exhaust nozzle, a duct means for providing communication of exhaust gas between the gas turbine and the exhaust nozzle, and a shroud which encloses the nozzle and duct means. The shroud is claimed as having an exit aperture through which, in use, the exhaust nozzle discharges, and wherein the exhaust nozzle is translatable from a first position, wherein an exit plane of the nozzle lies upstream of the exit aperture of the shroud, to a second position, wherein the exit plane of the exhaust duct lies substantially downstream of the exit aperture of the shroud. Such a shrouded nozzle arrangement is not disclosed in Wallace, Jr.

In particular, Wallace, Jr. fails to disclose at least the limitation of instant independent claim 1 that the shrouded nozzle arrangement includes a shroud which encloses the nozzle and the duct means. The Office Action alleges that the shroud limitation is disclosed in Wallace, Jr. as reference number 18 in the Figures. Applicants disagree. As disclosed in Wallace, Jr., reference number 18 refers to a point at which the pair of radially inner and radially outer relatively thin metallic walls 14 and 16 converge and are secured. See col. 2, line 64 to col. 3, line 1. Rather than forming a shroud as claimed, the thin metallic walls 14 and 16, which are joined at point 18, of Wallace Jr. merely correspond to the exhaust nozzle

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of the disclosed turbofan engine. Wallace, Jr. nowhere discloses that the turbofan engine further comprises a shroud, which encloses the nozzle and duct means, as claimed.

Furthermore, even if the thin metallic walls 14 and/or 16 of Wallace, Jr. were construed to be a shroud, Wallace, Jr. further fails to disclose the instant limitation of claim 1 that the exhaust nozzle is translatable from a first position, wherein an exit plane of the nozzle lies upstream of the exit aperture of the shroud, to a second position, wherein the exit plane of the exhaust duct lies substantially downstream of the exit aperture of the shroud. At most, Figures 1 and 2 and the detailed description of Wallace, Jr. merely disclose that the turbofan engine 10 includes a central body 32 and a housing 12 that are displaceable with respect to each other. See col. 2, line 64 to col. 3, line 38. However, in Figure 1, it is apparent that the central body 32 always extends beyond the exit plane of the nozzle, whether the central body 32 is in the retracted or extended position. Likewise, in Figure 2, Wallace, Jr. discloses that the central body 132 always extends beyond the exit plane of the nozzle, whether the housing 112 is in the extended or retracted positions. Wallace, Jr. thus fails to disclose that the exit nozzle is translatable between two positions, such that the exit plane of the nozzle lies upstream of the exit aperture of the shroud or substantially downstream of the exit aperture of the shroud.

Accordingly, Wallace, Jr. fails to disclose all of the limitations of the claimed invention. Wallace, Jr. thus does not anticipate claim 1, or any of the claims dependent therefrom. Reconsideration and withdrawal of the rejection are respectfully requested.

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B. Madden

Claims 1-3, 5-7, 9-11 and 13-15 are rejected under 35 U.S.C. §102(b) as being anticipated by Madden. The Office Action argues that Madden discloses all of the limitations of the claimed invention. Applicants respectfully traverse this rejection.

Claim 1 is discussed in detail above. The Office Action argues that Madden discloses all of the limitations of the claimed invention, including the shroud with an exit aperture as items 4 and 8 in the Figures. Applicants respectfully disagree.

As with Wallace, Jr., discussed above, Madden also fails to disclose at least the limitations of the claimed invention that the shrouded nozzle arrangement includes a shroud, and that the exhaust nozzle is translatable between the specified first and second positions such that the exit plane of the exhaust duct lies substantially upstream or substantially downstream of the exit aperture of the shroud.

First, like Wallace, Jr. discussed above, Madden fails to disclose that the described exhaust nozzle assembly includes a shroud. At most, Madden describes that the nozzle assembly includes an engine exhaust duct means 4 having opposed top and bottom walls 6 and 8. See col. 2, lines 46-50. Madden merely discloses that the disclosed exhaust duct means provides an exhaust duct, not that it in any way is or functions as a shroud for the exhaust nozzle. However, even if the exhaust duct means of Madden were construed to be a shroud, it is clear from the figures and detailed description that the exhaust duct means of Madden is distinct from the shroud and exhaust nozzle arrangement of the claimed invention. Although Madden discloses that the lower flap means 24 and upper flap means 22 are displaceable within the exhaust nozzle, it is clear from Figure 1 of Madden that the flap

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means always extend beyond an exit plane defined by the opposed top and bottom walls 6 and 8 of the exhaust duct means 4. Madden also fails to disclose that the exhaust nozzle is translatable between a first and second position, such that the exit plane of the nozzle lies upstream of the exit aperture of the shroud or substantially downstream of the exit aperture of the shroud.

For at least these reasons, Madden fails to disclose all of the limitations of the claimed invention. Madden thus fails to anticipate claim 1, or any of the claims dependent therefrom. Reconsideration and withdrawal of the rejection are respectfully requested.

C. Syltebo

Claims 1-3, 5-7, 9-11 and 13-15 are rejected under 35 U.S.C. §102(b) as being anticipated by Syltebo. The Office Action argues that Syltebo discloses all of the limitations of the claimed invention. Applicants respectfully traverse this rejection.

The claimed invention is described in detail above. The Office Action argues that Syltebo discloses all of the limitations of the claimed invention, including the claimed shroud with an exit aperture. Applicants respectfully disagree. The Office Action argues that the claimed shroud with an exit aperture is disclosed in Syltebo at reference numbers 12, 14, 34 and 36. This is incorrect. In Syltebo, reference numerals 12 and 14 refer to upper and lower duct passageways formed in the exhaust flow duct by a bifurcation structure 28. These upper and lower duct passageways 12 and 14 terminate in upper and lower discharge orifices, denoted reference numerals 34 and 36. See Syltebo at col. 3, lines 48-53. Thus, while reference numerals 12, 14, 34 and 36 may arguably relate to an exit aperture, these reference numerals and the corresponding structures in no way correspond to a shroud, as claimed.

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In fact, Syltebo fails to disclose that the described jet engine nozzle includes a shroud. Instead, Syltebo merely discloses that the nozzle 10 includes an outer housing 18 that defines an exhaust flow duct having an entrance orifice 20. See col. 3, lines 44-48. Accordingly, the outer walls of the ducts 12 and 14 form the exhaust nozzle, not a shroud that encloses the nozzle and duct means, as required in claim 1. Syltebo nowhere discloses that a further element, particularly a shroud, should be included to enclose the nozzle and duct means. Furthermore, in view of Syltebo's disclosure that the deflection doors 48 and 50 can be fully extended to provide thrust reversal or thrust spoilage, for example, as shown in Figure 4, Syltebo entirely fails to disclose how a shroud could even be incorporated into the disclosed jet engine nozzle arrangement.

Furthermore, because Syltebo fails to disclose the incorporation of a shroud, Syltebo further fails to disclose the instant claim limitation that the exhaust nozzle is translatable from a first to a second position with respect to the shroud. That is, Syltebo fails to disclose that the exhaust nozzle is translatable between the first and second positions such that an exit plane of the nozzle can lie upstream of the exit aperture of the shroud or substantially downstream of the exit aperture of the shroud.

For at least these reasons, Syltebo fails to disclose all of the limitations of the claimed invention. Syltebo thus does not anticipate independent claim 1 or any of the claims dependent therefrom. Reconsideration and withdrawal of the rejection are respectfully requested.

III. Rejection Under §103

The Office Action rejects the claims under 35 U.S.C. §103(a) over Helmtoller, Jr., in view of Hull, Jr. or Haberkorn. Although the Office Action does not specifically identify

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the claims that are rejected, Applicants assume in view of the indication of allowable subject matter that the rejection applies to, at most, claims 1-3, 5-7, 9-11 and 13-15. Applicants respectfully traverse this rejection.

The claimed invention is discussed in detail above. The Office Action asserts that Helmintoller, Jr. discloses all of the limitations of the claimed invention, except the limitation that an exhaust nozzle has an exit plane upstream of the exit aperture of the shroud when in a retracted position. However, the Office Action argues that such a limitation is disclosed in Hull and Haberkorn. Applicants respectfully disagree.

First, Applicants submit that Helmintoller, Jr. does not disclose a shroud, as claimed. The Office Action argues that the shroud is disclosed in Helmintoller, Jr. as reference number 20 in the Figures. However, based on the Figures and detailed description of the reference, it is clear that reference numeral 20 refers to a cowling that extends forwardly of the blades 14, defining an inlet 15 for the admission of air flow to the fan during the forward thrust producing position of the fan blades 14. See Helmintoller, Jr. at col. 2, lines 43-51. Nowhere does Helmintoller, Jr. disclose, teach or suggest that the cowling 20 is, functions as, or could be modified to function as, a shroud, as claimed. Instead, Helmintoller, Jr. merely discloses that the cowling in fact functions as an exhaust nozzle, by defining a variable fan nozzle 63, as shown in the Figures. See, for example, col. 3 at lines 25-28 and Figures 1 and 2.

Accordingly, in contrast to the claimed invention, Helmintoller, Jr. fails to disclose, teach or suggest either the incorporation of a shroud to enclose the nozzle and duct means, or that the exit nozzle is translatable from a first to a second position such that the exit plane of the nozzle lies either upstream or substantially downstream of the exit aperture of the shroud.

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Helmintoller, Jr. thus fails to disclose, teach or suggest all of the limitations of the claimed invention.

To overcome the above-described deficiencies of Helmintoller, Jr., the Office Action cites Hull, Jr. and Haberkorn. The Office Action argues that the secondary references disclose, in Figure 4 of Hull, Jr. or Figure 2 of Haberkorn, an exhaust nozzle whose exit plane is upstream of the exit aperture of the shroud when in a retracted position. With reference to Figure 4 of Hull, Jr., the reference likewise does not disclose, teach or suggest incorporation of a shroud into an engine structure. Instead, the reference merely discloses a sound suppressing nacelle arrangement, where a trailing edge of the nacelle 10, shown as reference number 64 in Figure 4, gradually tapers rearward so as to define an elongated, trough-like, over the wing surface 66 that functions as a concave sound reflecting shield. See Hull, Jr. at col. 3, lines 21-26. However, comparing Figures 2 and 4 of Hull, Jr., it is apparent that whether the engine structure is in the retracted or extended position, the engine structure extends beyond this trailing section 64 of the nacelle, and does not correspond to the exhaust nozzle and shroud arrangement required in independent claim 1.

In a similar manner, Haberkorn likewise does not disclose, teach or suggest either the incorporation of a shroud, or the specifically claimed exhaust nozzle and shroud arrangement of the claimed invention. In Figure 2 of Haberkorn, cited in the Office Action, the reference merely discloses that the exhaust nozzle extends beyond a plane defined by reference number 28. However, with reference to the full disclosure of the reference, reference number 28 merely corresponds to an adjustable closure flap that is provided for the exhaust opening 27. See Haberkorn at col. 5, lines 13-15. This closure flap is not a shroud, and is not disclosed or suggested to even operate in the manner of a shroud. One of ordinary skill in the art would

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not understand the disclosure of an adjustable closure flap for the exhaust opening to teach or suggest the incorporation of a separate shroud into an engine construction, as required in the claimed invention. Aside from that closure flap 28, Haberkorn likewise nowhere discloses, teaches or suggests the use of a shroud in the engine construction, as claimed, or the specifically claimed exhaust nozzle and shroud construction, where the exhaust nozzle is translatable from a first to a second position such that the exit plan of the nozzle lies upstream or substantially downstream of the exit aperture of the shroud.

All of the references, considered individually or in combination, would not have rendered obvious the claimed invention. As described above, none of Helmtoller, Jr., Hull, Jr. or Haberkorn disclose, teach or suggest the incorporation into the engine structure of a shroud, as required in independent claim 1. Furthermore, none of the references disclose, teach or suggest that the shroud and the exhaust nozzle should be so constructed such that the exhaust nozzle is translatable from a first to a second position such that the exit plane of the nozzle lies upstream or substantially downstream of the exit plane of the nozzle. Accordingly, one of ordinary skill in the art would not have been motivated to combine the separate teachings of the cited references, and then to further modify the resultant combination to practice the claimed invention.

For at least these reasons, independent claim 1, and the claims dependent therefrom, would not have been obvious to one of ordinary skill in the art. Reconsideration and withdrawal of the rejection are respectfully requested.

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IV. Conclusion

In view of the foregoing amendments and remarks, Applicants respectfully submit that the application is in condition for allowance. Favorable consideration and prompt allowance of the application are respectfully requested.

Should the Examiner believe that anything further is necessary in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the telephone number listed below.

Respectfully submitted,


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JAO/JSA:amw

Attachment:
Appendix

Date: February 26, 2003

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**DEPOSIT ACCOUNT USE
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APPENDIX

Changes to Specification:

Page 1, in between title and line 1, insert:

BACKGROUND OF THE INVENTION

1. Field of the Invention

Page 1, in between lines 3 and 5, insert:

2. Description of Related Art

Page 1, in between lines 21 and 23, insert:

SUMMARY OF THE INVENTION

Page 2, in between lines 6 and 8, insert:

BRIEF DESCRIPTION OF THE DRAWINGS

Page 2, in between lines 21 and 23, insert:

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Page 4, lines 11-20:

In this configuration, radar signals are either diffused by the shroud 10 or absorbed by special coatings applied to it. At the same time, exhaust gas 44 issuing from the exit of the gas turbine engine 6 passes down the duct means 2,4 and through the nozzle 8. Secondary air 46, taken from the airflow outside the shroud is directed through the shroud annulus. This secondary air 46 is at a lower temperature and pressure than the exhaust gas 44 and so cools the duct means, 2,4, nozzle 8 and shroud 10 thus reducing the infra-red signature as well as protecting any sensitive coatings applied to the shroud. The secondary air 4446 is then directed by the shroud 10 exit aperture to form a sheath of cool air around the exhaust gas 44

leaving the nozzle. This covering of cool air masks the infra-red signature of the exhaust plume.

Changes to Claims:

The following is a marked-up version of the amended claim(s):

1. (Amended) A shrouded nozzle arrangement for a gas turbine engine exhaust gas comprising a gas turbine, an exhaust nozzle, a duct means for providing communication of exhaust gas between the gas turbine and the exhaust nozzle, and a shroud which encloses the nozzle and duct means, the shroud having an exit aperture through which, in use, the exhaust nozzle discharges, ~~characterised in that wherein~~ the exhaust nozzle is translatable from a first position, wherein ~~the~~ an exit plane of the nozzle lies upstream of the exit aperture of the shroud, to a second position, wherein the exit plane of the exhaust duct lies substantially downstream of the exit aperture of the shroud.